



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/552,738

10/12/2005

Takashi Izumi

L9289.05183

4462

52989

-7590

04/23/2007

STEVENS, DAVIS, MILLER & MOSHER, LLP
1615 L. STREET N.W.
SUITE 850
WASHINGTON, DC 20036

EXAMINER

HU, RUI MENG

ART UNIT

PAPER NUMBER

2618

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
--	-----------	---------------

3 MONTHS

04/23/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/552,738

Applicant(s)

IZUMI ET AL.

Examiner

RuiMeng Hu

Art Unit

2618

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 October 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12 October 2005 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 02/22/2007, 10/12/2005.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____.

DETAILED ACTION

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Information Disclosure Statement

2. The information disclosure statements submitted on 10/12/2005 and 02/22/2007 have been considered by the Examiner and made of record in the application file.

Drawings

3. **Figures 1-3** should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

6. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. **Claims 1-2 and 4-5** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Prior Art Admission by the applicant** in view of **Miller et al. (US Patent 6356233)**.

Consider **claim 1**, Prior Art Admission clearly discloses an array antenna transmission and reception apparatus comprising: a plurality of antenna elements (figures 1 and 2, antennas 601, 701, Background Art of Specification); a baseband processing section (figures 2 and 3, 606 or 706, Background Art of Specification) that carries out weighting processing corresponding to said respective antenna elements on

transmission baseband signals to form transmission baseband signals with directivity and carries out weighting processing corresponding to said respective antenna elements on the reception baseband signals received from said plurality of antenna elements to form reception baseband signals with directivity.

However, Prior Art Admission discloses transmission and reception circuitries in two separate embodiments.

The teaching of radio transceiver that capable of radio signal transmitting and receiving is well known in the art such as the transceiver system disclosed by Miller et al. (figures 1 and 2, transmit-receive modules TR₁-TR_N, column 1, lines 47-49, column 2 line 64-column 3 line 5).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to incorporate the selection techniques taught by Miller et al. into the Prior Art Admission as to include a transceiver system capable of transmitting and receiving radio signals for reducing electronic components.

Prior Art Admission further discloses a plurality of transmission radio sections provided between said baseband processing section and said plurality of antenna elements that convert said transmission baseband signals with directivity to radio signals (figure 2, transmission radio section 602, Background Art); a plurality of reception radio sections provided between said baseband processing section and said plurality of antenna elements that convert the radio signals received from said antenna elements to reception baseband signals (figure 3, reception radio section 702, Background Art); a phase calibration transmission signal conversion section that

Art Unit: 2618

converts said radio signals output from said plurality of transmission radio sections to reference baseband signals for phase calibration and inputs said reference baseband signals to said baseband processing section (figure 2, phase calibration transmission signal conversion section 605, Background Art); a phase calibration received signal conversion section that converts said radio signals received from said plurality of antenna elements to reference baseband signals for phase calibration and inputs said reference baseband signals to said baseband processing section (figure 3, phase calibration transmission signal conversion section 705, Background Art).

However, Prior Art Admission fails to disclose a plurality of directivity couplers provided between said antenna elements and said transmission radio section and between said antenna elements said reception radio section.

In the same field of endeavor, Miller et al. clearly disclose a plurality of directivity couplers provided between antenna elements and transmission radio section and between antenna elements and reception radio section (figures 1-3, directional couplers D1-D6 provided between antenna elements A₁-A_N and transmit-receive modules TR₁-TR_N for amplitude and phase calibration (column 4 lines 6-10, column 8 lines 46-58, column 10 lines 4-30)).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to incorporate the selection techniques taught by Miller et al. into the Prior Art Admission as to include a transceiver system capable of transmitting and receiving radio signals and a plurality of directional couplers in which each of the directional couplers capable of directionally transmitting signal during both

signal transmission and reception phase calibrations for the benefits of reducing electronic components or circuit size and accurately carry out phase calibration for both signal transmission and reception. Thus Prior Art Admission as modified by Miller et al. clearly disclose a first selection section (*Prior Art Admission figure 2, switch 604, section 605*) that selectively supplies one of said plurality of radio signals from said transmission radio section attenuated and output by said directivity couplers (*directional couplers between antenna elements and transmit-receive modules*) to said phase calibration transmission signal conversion section; and a second selection section (*Prior Art Admission figure 3, switch 704, section 705*) that selectively supplies one of said radio signals from said antenna elements attenuated and output by said directivity couplers (*directional couplers between antenna elements and transmit-receive modules*) to said phase calibration received signal conversion section.

Consider **claim 2 as applied to claim 1**, Prior Art Admission as modified by Miller et al. clearly discloses wherein said directivity coupler comprises: a first connection terminal connected to said antenna elements (*Miller et al. figures 1-2, connection terminal 3 of directional coupler D1 connected to antenna element A1*); a second connection terminal connected to said transmission radio section and said reception radio section (*Miller et al. figure 2, connection terminal 4 of directional coupler D1 connected to transmit-receive module 1*); a third connection terminal with directivity toward said first connection terminal and connected to said phase calibration received signal conversion section (*Miller et al. disclose the directivities of directional coupler D1 in column 4 lines 21-27 and column 8 lines 46-58, connection terminal 1 of directional*

coupler (D1) with directivity toward connection terminal 3 of D1 as adaptive for calibration signal during signal reception thus terminal 1 of D1 connected to phase calibration received signal conversion section) and a fourth connection terminal with directivity toward said second connection terminal (connection terminal 2 of directional coupler D1 with directivity toward connection terminal 4 of D1 as adaptive for calibration signal during signal transmission thus terminal 2 of D1 connected to phase calibration transmission signal conversion section) and connected to said phase calibration transmission signal conversion section.

Consider **claim 4 as applied to claim 2**, The teaching of using band pass filter in radio transceiver is well known in the art, and Miller et al. clearly suggest that in order to maximize the utility of array antennas, it is common to introduce electronic amplifiers into the array antenna system, to aid in overcoming the losses attributable to the beam-former and to the phase shifters, if any, and any associated hardware such as filters and the like (column 2 lines 30-46).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to incorporate the selection techniques taught by Miller et al. into the Prior Art Admission as modified by Miller et al. as to include band pass filters on transmission and reception signal lines to remove noises or unwanted signals. Thus Prior Art Admission as modified by Miller et al. discloses further comprising: a first band pass filter between said phase calibration received signal conversion section and said third connection terminal that selects said radio signals received by said antenna elements and allows said radio signals to pass (as to remove noises of the received

signals); and a second band pass filter between said phase calibration transmission signal conversion section and said fourth connection terminal that selects said radio signals output from said transmission radio section and allows said radio signals to pass (as to remove noises of the transmission signals).

Consider **claim 5 as applied to claims 2**, Prior Art Admission as modified by Miller et al. clearly discloses further comprising an antenna duplexer (Miller et al. column 2 line 64-column 3 line 5) connected to said transmission radio section, said reception radio section (transmit modules and receive modules) and said second connection terminal of said directivity coupler (connection terminal 4 of directional coupler D1) that outputs said radio signals output (during transmission) from said transmission radio section (transmit modules) to said second connection terminal (connection terminal 4 of directional coupler D1) and outputs said radio signals (during reception) output from said second connection terminal (connection terminal 4 of directional coupler D1) to said reception radio section (receive modules).

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over **Prior Art Admission by the applicant** as modified by **Miller et al. (US Patent 6356233)** in view of **Sikina et al. (US Patent 6208287)**.

Consider **claim 3 as applied to claim 2**, Prior Art Admission as modified by Miller et al. clearly discloses further comprising: a first switch (Prior Art figure 3, switch 704) between said phase calibration received signal conversion section (figure 3, section 705) and said third connection terminal (connection terminal 1 of directional

coupler D1) that connects said phase calibration received signal conversion section and a second switch (Prior Art figure 2, switch 604) between said phase calibration transmission signal conversion section (figure 2, section 605) and said fourth connection terminal (connection terminal 2 of directional coupler D1) that connects said phase calibration transmission signal conversion section.

However, Prior Art Admission as modified by Miller et al. fails to disclose termination to said fourth connection terminal and termination to said third connection terminal.

In the same field of endeavor, Sikina et al. clearly disclose during normal mode (not calibration mode) the Normal/Calibration (N/C) control signal terminates the calibration signal lines by switching the switches 72a-72d to loads 74a-74d (column 5 lines 45-50, figure 1B, N/C control signal controls switches 72a-7d).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to incorporate the selection techniques taught by Sikina et al. into the Prior Art Admission as modified by Miller et al. as to include a termination means to switch between normal mode and calibration mode.

Conclusion

Any response to this Office Action should be **faxed to (571) 273-8300 or mailed**

to: Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Hand-delivered responses should be brought to

Customer Service Window
Randolph Building
401 Dulany Street
Alexandria, VA 22314

Any inquiry concerning this communication or earlier communications from the examiner should be directed to RuiMeng Hu whose telephone number is 571-270-1105. The examiner can normally be reached on Monday - Thursday, 8:00 a.m. - 5:00 p.m., EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edan Orgad can be reached on 571-272-7884. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

RuiMeng Hu
R.H./rh
April 12, 2007

EDAN ORGAD
PRIMARY PATENT EXAMINER

Edan Orgad 4/14/07